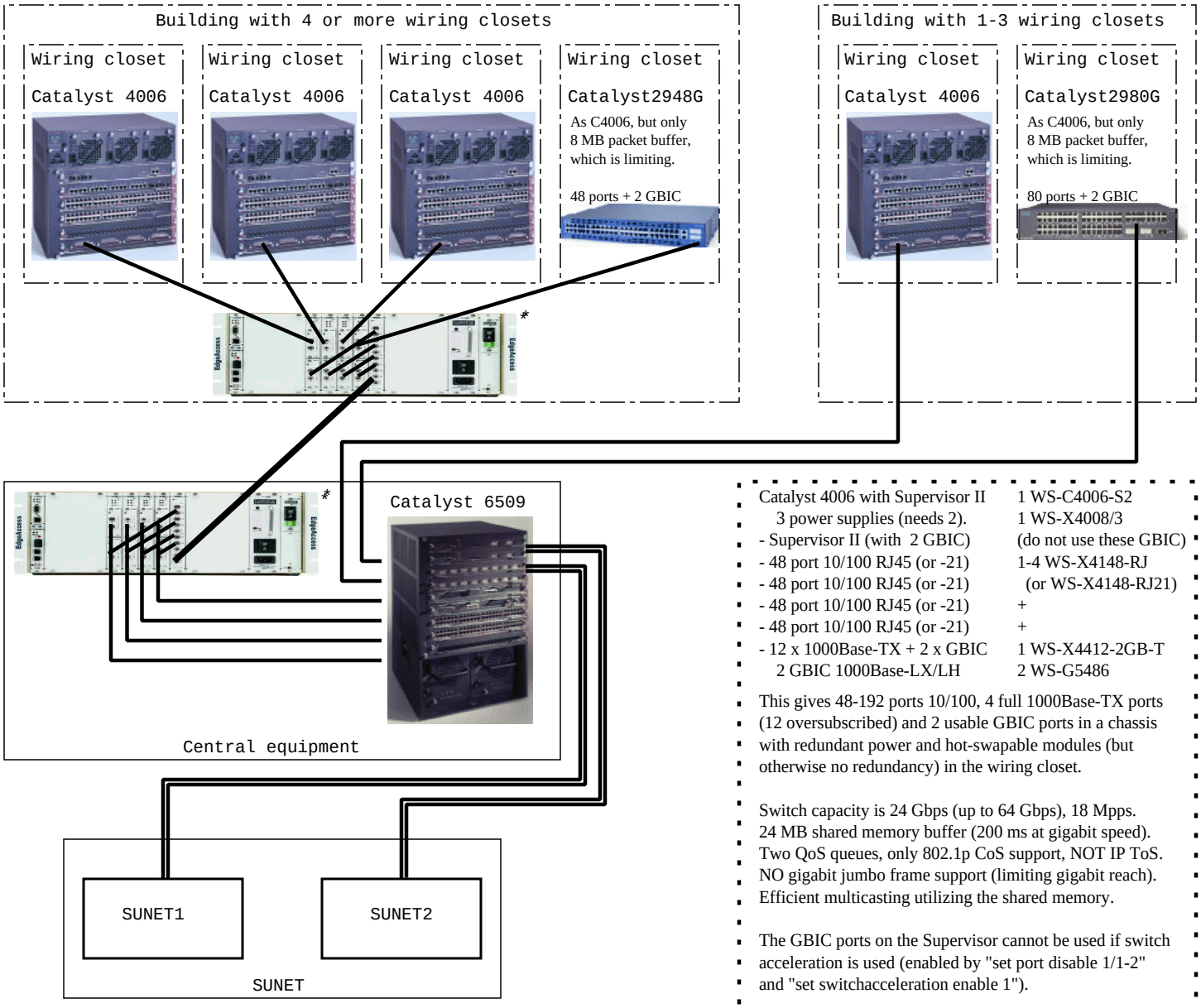
Figure 2: example network, mainly Cisco equipment, large campus,
up to around 80 wiring closets, 15000 connections.
(assuming 4 pairs of single mode fiber to each building)

ada@umu.se 2000-12-25



Catalyst 4006 with Supervisor II	1 WS-C4006-S2
3 power supplies (needs 2).	1 WS-X4008/3
- Supervisor II (with 2 GBIC)	(do not use these GBIC)
- 48 port 10/100 RJ45 (or -21)	1-4 WS-X4148-RJ
- 48 port 10/100 RJ45 (or -21)	(or WS-X4148-RJ21)
- 48 port 10/100 RJ45 (or -21)	+
- 48 port 10/100 RJ45 (or -21)	+
- 12 x 1000Base-TX + 2 x GBIC	1 WS-X4412-2GB-T
2 GBIC 1000Base-LX/LH	2 WS-G5486

This gives 48-192 ports 10/100, 4 full 1000Base-TX ports (12 oversubscribed) and 2 usable GBIC ports in a chassis with redundant power and hot-swapable modules (but otherwise no redundancy) in the wiring closet.

Switch capacity is 24 Gbps (up to 64 Gbps), 18 Mpps.
24 MB shared memory buffer (200 ms at gigabit speed).
Two QoS queues, only 802.1p CoS support, NOT IP ToS.
NO gigabit jumbo frame support (limiting gigabit reach).
Efficient multicasting utilizing the shared memory.

The GBIC ports on the Supervisor cannot be used if switch acceleration is used (enabled by "set port disable 1/1-2" and "set switchacceleration enable 1").

The 1000Base-TX module is oversubscribed, grouped ports 1-4, 5-8, 9-12. The GBIC ports are linespeed and one is used as the uplink port with a 1000Base-LX/LH GBIC that can be used both over multimode (max 550 meters) and singlemode fibre (max 10 km). Alternatively a 1000Base-SX multimode only GBIC reaching 220 meters.

The C2948G and C2980G are basically fixed configuration C4003, and thus only have 8 MB packet memory, which is limiting. The C29xx/35xx XL only have 4 MB packet memory, which is too little for a gigabit edge switch.

Spanning tree turned off on all ports. Dual MSFC modules for layer three redundancy. Use gigabit etherchannel to get layer two redundancy and higher uplink capacity to critical edge switches.

* Which Multiplex to use is still unclear. The Cisco Metro 1500 MAN is too expensive. Used above is the less expensive Canoga-Perkins UCS/6004/L600 WWDM (4 channels, up to 8 channels in a single chassis) solution. Alternatives are eagerly awaited. Cisco will have GBICs for different wavelengths, meaning that the Multiplex can be reduced to only a standalone optical splitter (the 6004 module connecting the two chassis above in a standalone box).

Catalyst 6509 chassis with 2500W power	1 WS-C6509-2500AC
and redundant 2500W power supply	1 WS-CAC-2500W/2
- Supervisor II including 2 GBICs with	1 WS-X6K-S2-MSFC2
PFC II (policy feature card 2) and	2 MEM-MSFC2-512MB
MSFC II (multilayer switch feature card 2)	2 MEM-C6K-FLC24M
with 512 MB memory, 24 MB flash	
- Redundant Supervisor exactly as above.	1 WS-X6K-S2-MSFC2/2
- SFM (switch fabric module), in slot 6.	1 WS-C6500-SFM
- 1-5 GBIC 16 port modules, fabric enabled	1-5 WS-X6516-GBIC
- future 10 gigabit DPT (or ethernet) module.	1 WS-???

This gives 16-80 GBIC wiring closet connections, and 4 Supervisor GBICs for the SUNET connections, in a chassis with everything hot-swapable and redundant; power supplies, switching engines (supervisors), routers (MSFCs), and backplanes (256 Gbps SFM backed up by 32 Gbps backplane). 30 Mpps both layer 2 and 3.

All gigabit modules have jumbo frame support (9kB MTU) and handle CoS and ToS with 2 or 3 queues per port. Gigabit etherchannels from ports on separate modules for increased redundancy. NO server connections on this box as not enough buffering to handle long-delay gigabit connections (64 kB for 10/100 ports gives 0.5 ms, 512 kB for Gb ports gives 4 ms). Gigabit connected servers feasible, but better to connect these to gigabit ports on separate C4006 unless jumbo frame support is needed.

Note that DFC (distributed forwarding card) daugher cards are NOT used. Using these you would need two SFM for redundancy, and furthermore they are only supported in the integrated Supervisor IOS software, which lacks a lot of desirable features, like stateful failover, hitless software upgrades, jumbo frames, 802.1Q tunneling etc.